អ្នកជំនាញខាងជាណកសាស្ត្រឥណ្ឌូចិន
The Indochina Entomologist
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OPEN ACCESS
New Taxon
ICE, 2 (8): 81–99 (2026)
ISSN (Online) 3065-1107
www.indochinaentomologist.com

https://doi.org/10.70590/ice.2026.02.08
http://zoobank.org/urn:lsid:zoobank.org:pub:E13E860A-C3D8-4215-BF45-B185E9440A87

Redescription of the species *Risefronta albicincta* Li & Wang, 2001 and description of a new genus *Paraconvexana* from China (Hemiptera: Cicadellidae: Evacanthinae)

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Abstract: The leafhopper species *Risefronta albicincta* Li & Wang, 2001 is redescribed and illustrated. It is the first description of the female genitalia for this species. *Paraconvexana* **gen. nov.** and *Paraconvexana rufa* (Li, 1994) **comb. nov.** (as type species) from China are described and illustrated. A key to Chinese genera of the tribe Evacanthini (Hemiptera: Cicadellidae: Evacanthinae) is provided. The examined specimens are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Keywords: Hemiptera, leafhopper, new taxa, redescription, taxonomy

白带突额叶蝉物种重新描述及新属拟凸冠叶蝉属描述（半翅目：叶蝉科：横脊叶蝉亚科）

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摘要：本文对白带突额叶蝉进行了重新描述并附图。首次补充描述雌性外生殖器结构特征。同时对新属拟凸冠叶蝉属 *Paraconvexana* **gen. nov.**和新组合红色拟凸冠叶蝉 *Paraconvexana rufa* (Li, 1994) **comb. nov.**（模式种）进行了描述并附图。并提供了中国横脊叶蝉族分属检索表。所有检视标本保存于贵州大学昆虫学研究所（GUGC）。

关键词：半翅目，叶蝉，新分类单元，重描述，分类

Citation: Gou G-L & Xing J-C 2026: Redescription of the species *Risefronta albicincta* Li & Wang, 2001 and description of a new genus *Paraconvexana* from China (Hemiptera: Cicadellidae: Evacanthinae). *The Indochina Entomologist*, 2 (8): 81–99. [苟光利 & 邢济春: 白带突额叶蝉物种重新描述及新属拟凸冠叶蝉属描述（半翅目：叶蝉科：横脊叶蝉亚科）. 中南半岛昆虫学家, 2 (8): 81–99.]
https://doi.org/10.70590/ice.2026.02.08

Accepted by Cheng-Bin WANG: 2.II.2026; published online: 6.II.2026

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Introduction

The leafhopper genus *Risefronta* was established by Li and Wang (2001) for *Risefronta albicincta* Li & Wang, 2001 from Yunnan Province of China. It belongs to the tribe Evacanthini of subfamily Evacanthinae (Hemiptera: Cicadellidae), with the anterior end of the crown angular, with a transverse ridge, a margin ridge and two median longtudinal ridges, the frontoclypeus significantly elevated (Dietrich 2004; Li *et al.* 2020). So far, this genus includes only the type species. We redescribe the species *R. albicincta* Li & Wang, 2001, including male and female external morphology and genitalia. A key to Chinese genera of the tribe Evacanthini is provided. At the same time, we also describe a new genus *Paraconvexana* **gen. nov.**, with *Convexana rufa* Li, 1994 as its type species from China.

Material and methods

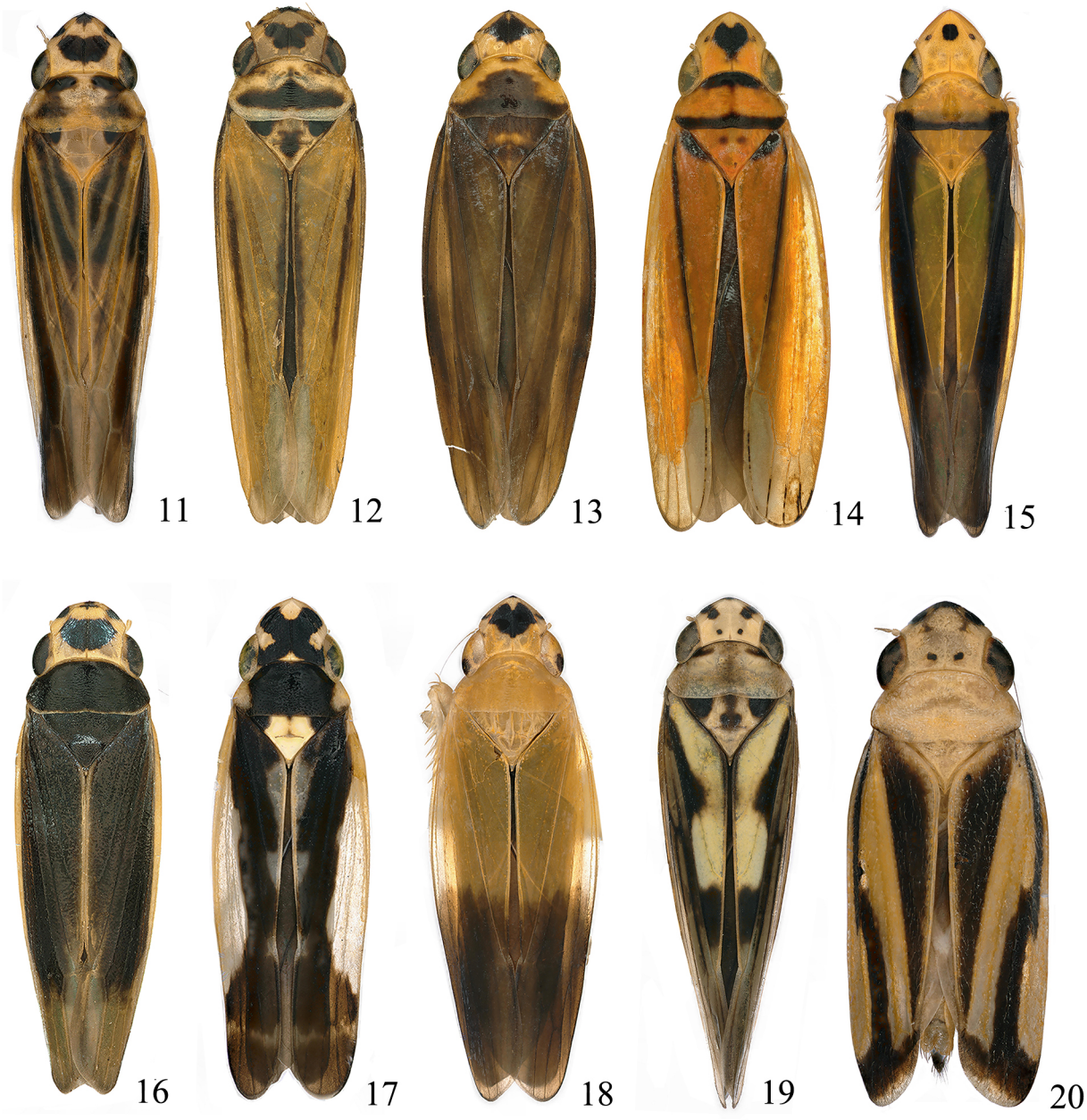
Dry male specimens were used for the descriptions and illustrations. External morphology was observed under a stereoscopic microscope and characters were measured with an ocular micrometer. Color pictures for adult habitus were obtained by KEYENCE VHX-6000 system. The genital segments of the examined specimens were macerated in 10% NaOH and drawn from preparations in glycerin jelly using a Leica MZ 12.5 stereomicroscope. Illustrations were scanned with Canon CanoScan LiDE 200 and imported into Adobe Photoshop CS8 for labeling and plate composition. Terminology of morphological and genital characters follows Li *et al.* (2020). The examined specimens are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Key to genera of Evacanthini from China (modified from Li *et al.* 2020)

1. Length of crown more than 3 times width of eyes (Fig. 29) ..... *Vangama*
   Length of crown less than 3 times width of eyes 2
2. Forewings with irregular piebaldness (Figs 21, 22, 23, 24, 28) 3
   Forewings without irregular piebaldness 7
3. Forewings with yellowish-white patches, terminal veins orange (Fig. 28) ..... *Parapythamus*
   Forewings without yellowish-white patches, terminal veins not orange 4
4. The length of crown as two times between eyes (Figs 23, 24) 5
   The length of crown less than two times between eyes 6
5. Pygofer side with ventral process ..... *Striatanus*
   Pygofer side without ventral process ..... *Riseveinus*
6. Pygofer side with ventral process ..... *Transvenosus*
   Pygofer side without ventral process ..... *Cunedda*
7. Body bright red (Figs 49–56) ..... ***Paraconvexana* gen. nov.**
   Body not bright red 8
8. Crown strongly flattened; frontoclypeus not bulging (Fig. 6) ..... *Concavocorona*
   Crown not strongly flattened; frontoclypeus slight or distinct bulging 9
9. Frontoclypeus distinctly bulging (Fig. 7) ..... *Risefronta*
   Frontoclypeus slightly bulging 10
10. Length of crown less than between eyes (Fig. 16) ..... *Shortcrowna*
    Length of crown more than between eyes 11

11. Middle carina distinctly hollow on both sides (Fig. 17) ..... *Concaves*
    Middle carina not distinctly hollow on both sides 12
12. Aedeagus with a long ventral process and its apex forked ..... *Paraonukia*
    Aedeagus without a long ventral process or its apex forked 13
13. Crown with black spots (Figs 11–15, 18–20) 14
    Crown without black spots 24
14. Anterior margin of crown with a transverse carina or limit 15
    Anterior margin of crown without transverse limit 16
15. Anterior margin of crown with a transverse carina (Fig. 10) ..... *Evacanthus*
    Anterior margin of crown with a transverse limit (Fig. 20) ..... *Boundarus*
16. Pygofer side with ventral process 17
    Pygofer side without ventral process 23
17. Apex of aedeagus with lots of pricks ..... *Subulatus*
    Apex of aedeagus without prick 18
18. Pygofer side with apical process 19
    Pygofer side without apical process 20
19. Apical process of pygofer side slender ..... *Paracarinata*
    Apical process of pygofer side not slender ..... *Ventroprojecta*
20. Base of aedeagus with a pair of ventral long processes ..... *Processus*
    Base of aedeagus without a pair of ventral long processes 21
21. Aedeagus with arcuate ventral apophysis ..... *Apphia*
    Aedeagus without arcuate ventral apophysis 22
22. Aedeagus with ventral slice-like process ..... *Carinata*
    Aedeagus without ventral slice-like process ..... *Onukiana*
23. Aedeagus with a long apical process ..... *Onukiades*
    Aedeagus without a long apical process ..... *Bundera*
24. Middle of body with white longitudinal stripe (Figs 1–3) 25
    Middle of body without white longitudinal stripe 27
25. White longitudinal stripe at middle of crown, pronotum and scutellum (Fig. 1) ..... *Taperus*
    White longitudinal stripe at middle of crown 26
26. Crown dark brown or red (Fig. 2) ..... *Convexana*
    Crown yellowish-brown (Fig. 3) ..... *Oncusa*
27. Middle carina of crown strongly crest-likely elevated (Fig. 25) ..... *Pythamus*
    Middle carina of crown strongly not crest-likely elevated 28
28. Pygofer side curved at end ..... *Bentus*
    Pygofer side not curved at end 29
29. Middle of crown with two white spots (Fig. 27) ..... *Multiformis*
    Middle of crown without two white spots 30
30. Aedeagus with a ventral long process at base ..... *Simaonukia*
    Aedeagus with a ventral slice-like process ..... *Onukia*

FIGURES 1–10. Species of Evacanthini, ♂, dorsal view: **1** *Taperus fasciatus* Li & Wang, 1994 **2** *Convexana albitapeta* Li, Li & Xing **3** *Oncusa rugosa* (Li & Wang, 1996) **4** *Onukiades albicostatus* Li & Wang, 2002 **5** *Simaonukia longispinus* Li & Li, 2017 **6** *Concavocorona abbreviata* (Jacobi, 1944) **7** *Risefronta albicincta* Li & Wang, 2001 **8** *Onukia nigra* Li & Wang, 1991 **9** *Bentus flavomaculatus* (Kato, 1933) **10** *Evacanthus camberus* Li, Li & Xing, 2020.



FIGURES 11–20. Species of Evacanthini, ♂, dorsal view: **11** *Processus bistigmanus* (Li & Zhang, 1993) **12** *Shortcrowna flavocapitata* (Kato, 1933) **13** *Angustuma nigricarina* (Li, 1986) **14** *Carinata ganga* Li & Wang, 1992 **15** *Paracarinata crocicrowna* Li, Li & Xing, 2020 **16** *Bundera venata* Distant, 1908 **17** *Concaves flavopunctatus* (Li & Wang, 1991) **18** *Ventroprojecta nigriguttata* Li, Li & Xing **19** *Subulatus bipunctatus* Yang & Zhang, 2001 **20** *Boundarus trimaculatus* Li & Wang, 1998.

FIGURES 21–29. Species of Evacanthini, ♂, dorsal view: **21** *Cunedda hyalipictata* (Li & Wang, 2006) **22** *Transvenosus sacculuses* Li, Li & Xing, 2020 **23** *Striatanus dentatus* Li & Wang, 1995 **24** *Riseveinus baoshanensis* Li & Li, 2012 **25** *Pythamus hainanensis* Wang & Zhang, 2015 **26** *Paraonukia arisana* (Matsumura, 1912) **27** *Multiformis nigrafacialis* Li & Li, 2012 **28** *Parapythamus suiyangensis* Li & Li, 2011 **29** *Vangama picea* Wang & Li, 1999.

Taxonomy

Risefronta Li & Wang, 2001

Risefronta Li & Wang, 2001: 518; Li *et al.* 2020: 253.

Type species: *Risefronta albicincta* Li & Wang, 2001.

Description. Body robust. Vertex, pronotum black, eyes brownish black, ocelli pale white, face black, forewing black brown, legs yellow. Head including eyes narrower than greatest width of pronotum. Median length of crown shorter than width between eyes. Eyes large. Anterior of vertex with two median longtudinal ridges, apex with a marginal ridge, one-third of apical with a distinct transverse ridge. Transverse ridge and marginal ridge are linked by short longitudinal ridge. Ocelli placed on the side of the longitudinal ridge. Frontoclypeus convex, distinctly longer than width, with a longtudinal ridge and its both side with numerous transverse carinae. Anteclypeus low

and flat. Pronotum convex, with some transverse winkles. Scutellum triangular, slightly shorter than pronotum, posterior margin yellow. Forewings with four apical cells and two subapical, appendix narrow and small. Vertex, pronotum, scutellum and forewings with thickly finely punctate. Profemur with 2 dorsoapical setae, row AM with 1 stout seta, intercalary row with 15–17 setae. Hind femur apical setal formula 2+1+1. Hind tibia flattened and nearly straight, row PD with approximately 19 macrosetae decreasing in length toward the base; row AD with approximately 10 long stout setae.

Male genitalia. Male pygofer side base wide, apex narrow, with a ventral slender process and few macrosetae on posterior area. Subgenital plate broad and leaf-like, median area with a row of strong setae. Aedeagus with short preatrium attached to dorsal connective. Connective Y-shaped and stem longer than arms. Style apex long and curved extended to the outside.

Remarks. This genus is similar to the genus *Evacanthus* Le Peletier & Serville, 1825, but can be distinguished from the latter by the frontoclypeus strongly bulging; anteclypeus low and flat; aedeagus with short preatrium attached to dorsal connective.

Distribution. China (Yunnan, Xizang).

Risefronta albicincta Li & Wang, 2001

Risefronta albicincta Li & Wang, 2001: 519; Li *et al*. 2020: 254.

Figs 30–48

Material examined. Holotype: 1♂, China: **Yunnan Prov.**, Pianma, 16 August 2000, coll. Maofa Yang. (GUGC). Paratype: 1♂, same data as holotype; 1♂1♀, **Yunnan Prov.**, Pianma, 20 August 2002, coll. Zizhong Li. (GUGC); 1♂4♀, **Xizang Autonomous Region**, Motuo, 15 August 2020, coll. Yongjin Sui. (GUGC).

Description. Male body black, robust and fuscous (Fig. 30). Head dark, anterior margin of vertex angularly convex, with a marginal ridge and transverse ridge (Fig. 32). Eyes yellowish brown. Ocellus white. Frontoclypeus spherical bulge with black transverse carinae (Fig. 33). Forewings dark brown, caudal edge yellowish white, veins black brown (Figs 30, 31). Legs yellow. Female frontoclypeus more bugle than male (Fig. 35), scutellum posterior margin white (Figs 34, 36), forewings middle margin with a large white spot (Figs 34, 35).

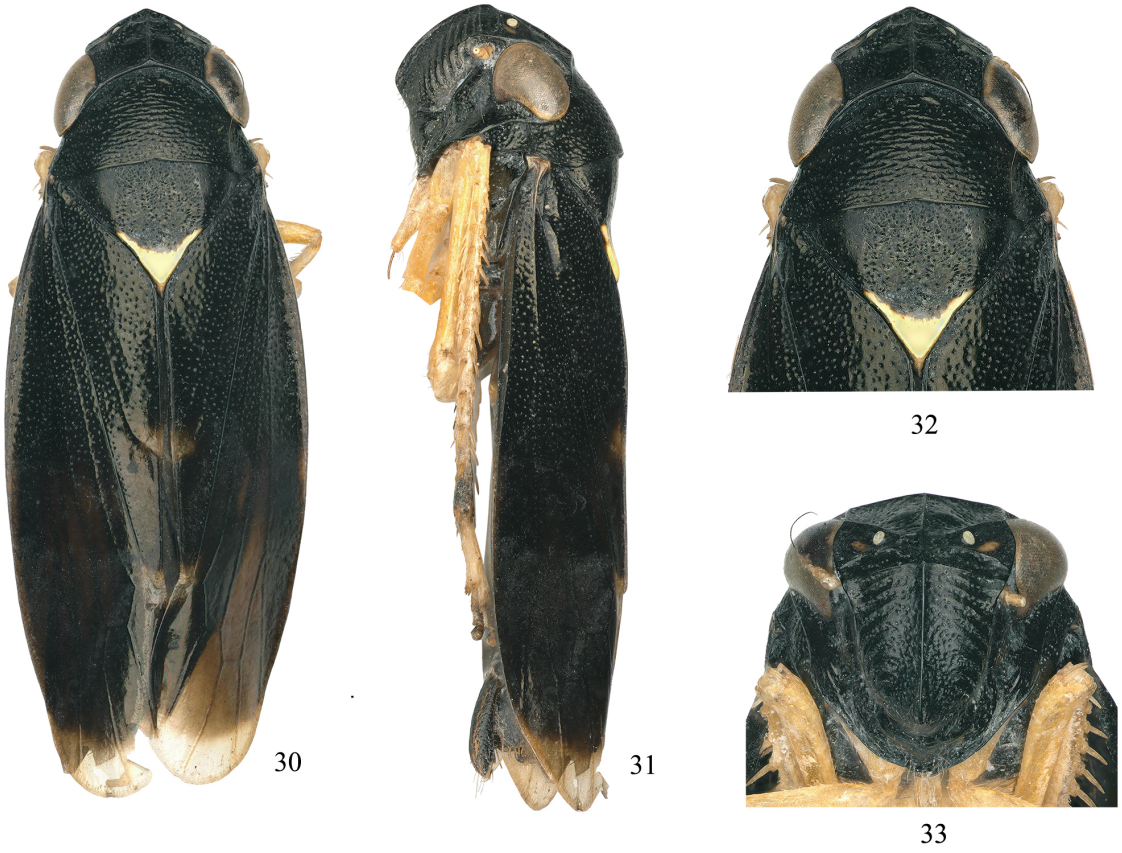
Male genitalia. Pygofer side broadly rounded in lateral aspect, with 8 macrosetae on posterior area and a ventral slender process, inner with a triangular shaped lobe extended from base of anal tube to apex of apodeme (Fig. 38). Subgenital plate long, with 7 long macrosetae along lateral margin and several long and thin setae on distal area (Figs 38, 39). Aedeagal short and robust, the both end of medially ventral margin with a slice shaped process, apex tube-like curved. Dorsal apodeme articulated with a lamellar dorsal connective (Figs 40, 41). Style subapical half curved and apical half expended outward (Fig. 42). Connective Y-shaped and arms nearly 1/3 length of stem (Fig. 42).

Female genitalia. Pygofer with ventroposterior margin slightly incurved (Fig. 43). Female seventh sternite as broad as long at base, with depressed on the middle of posterior margin (Fig. 44). First valvula of ovipositor sculpture strigate (Figs 45, 46). Second valvulae with strigate sculpture, denticulate area confined to distal about 1/2, gradually becoming smaller distally, apex pointed (Figs 47, 48).

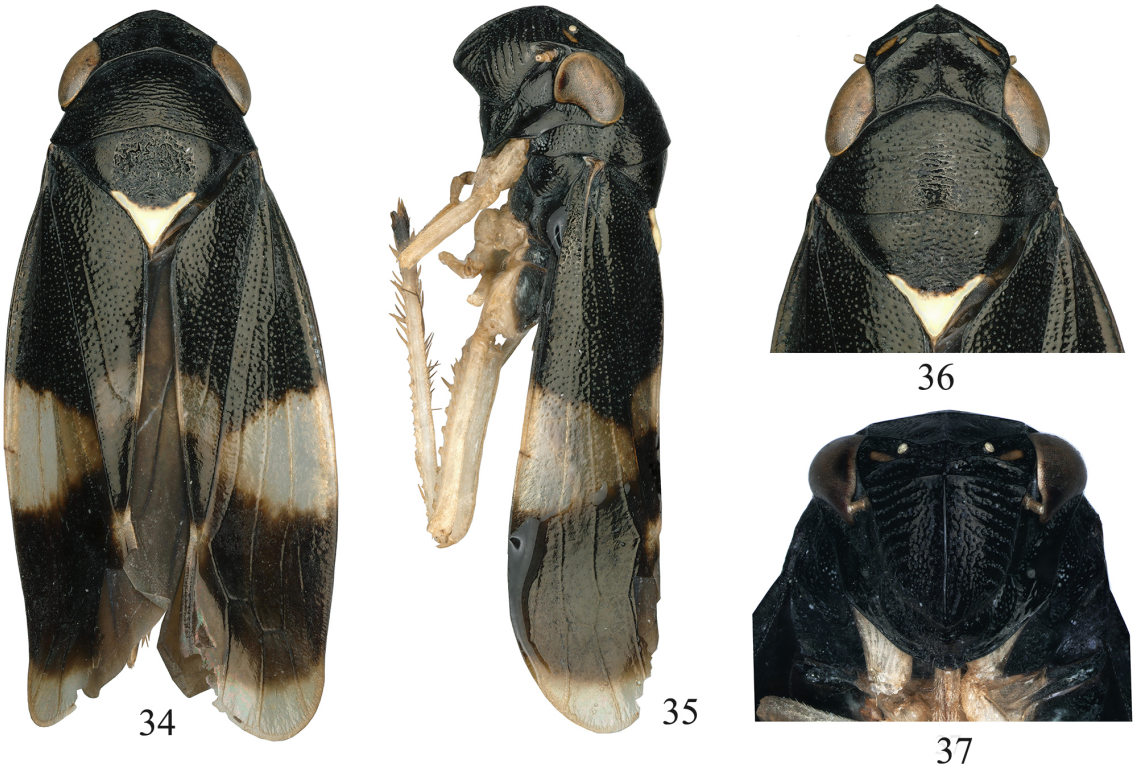
Distribution. China (Yunnan, Xizang).

Measurement. Length (including tegmen): ♂ 5–6 mm, ♀ 6.1–6.4 mm.

Remarks. The original illustrations of the species *R. albicincta* Li & Wang, 2001 contain some errors, particularly in the depiction of the aedeagus, which lacks the lamellar process. This resulted in inaccurate figures. Here, we have examined and compared the type specimens, and retook the photos of the male genitalia based on the specimens from Tibet, and provided the first illustration of the female genitalia for this species.

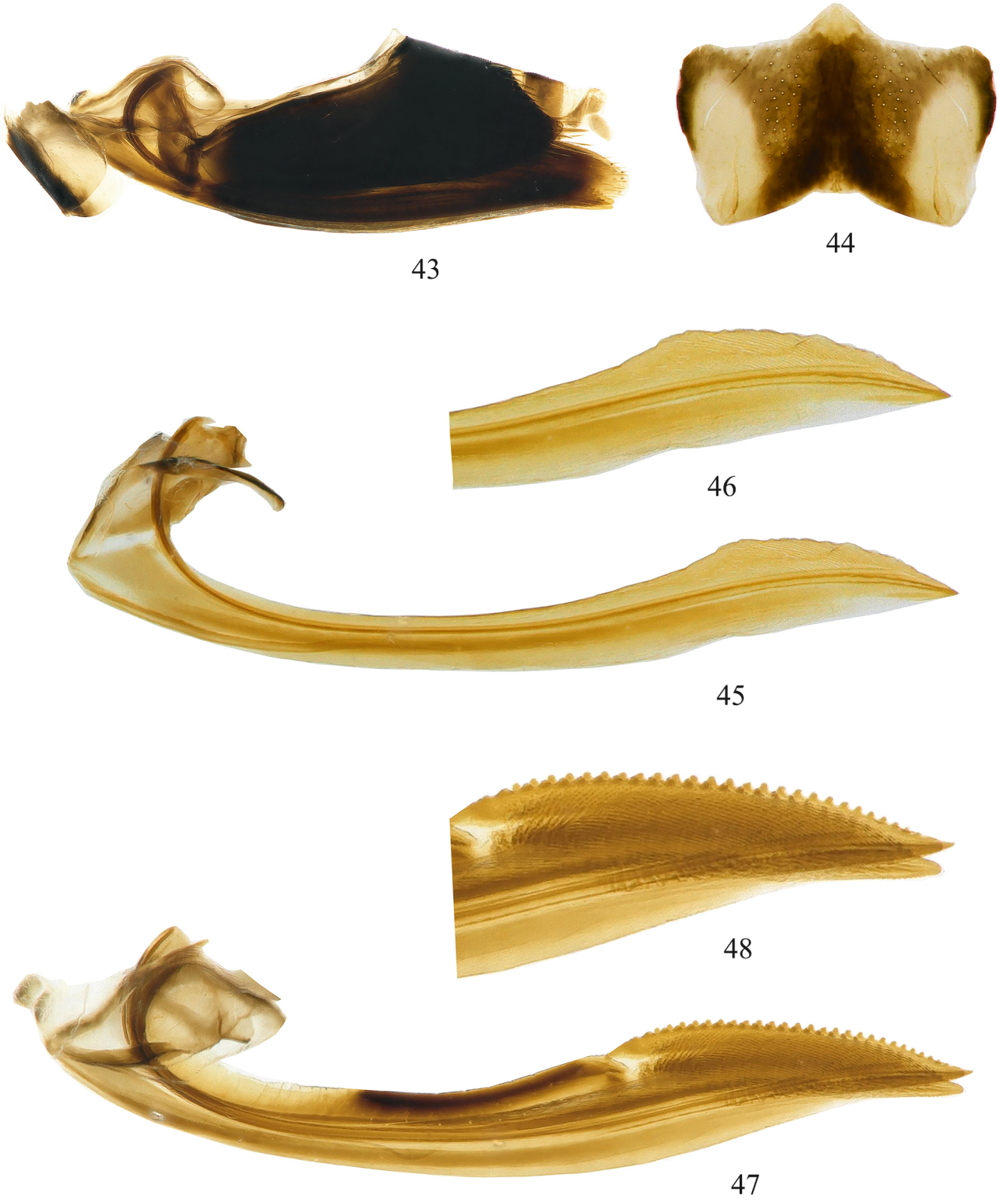


FIGURES 30–33. *Risefronta albicincta* Li & Wang, 2001, ♂: **30** dorsal view **31** lateral view **32** Head and thorax, dorsal view **33** face.

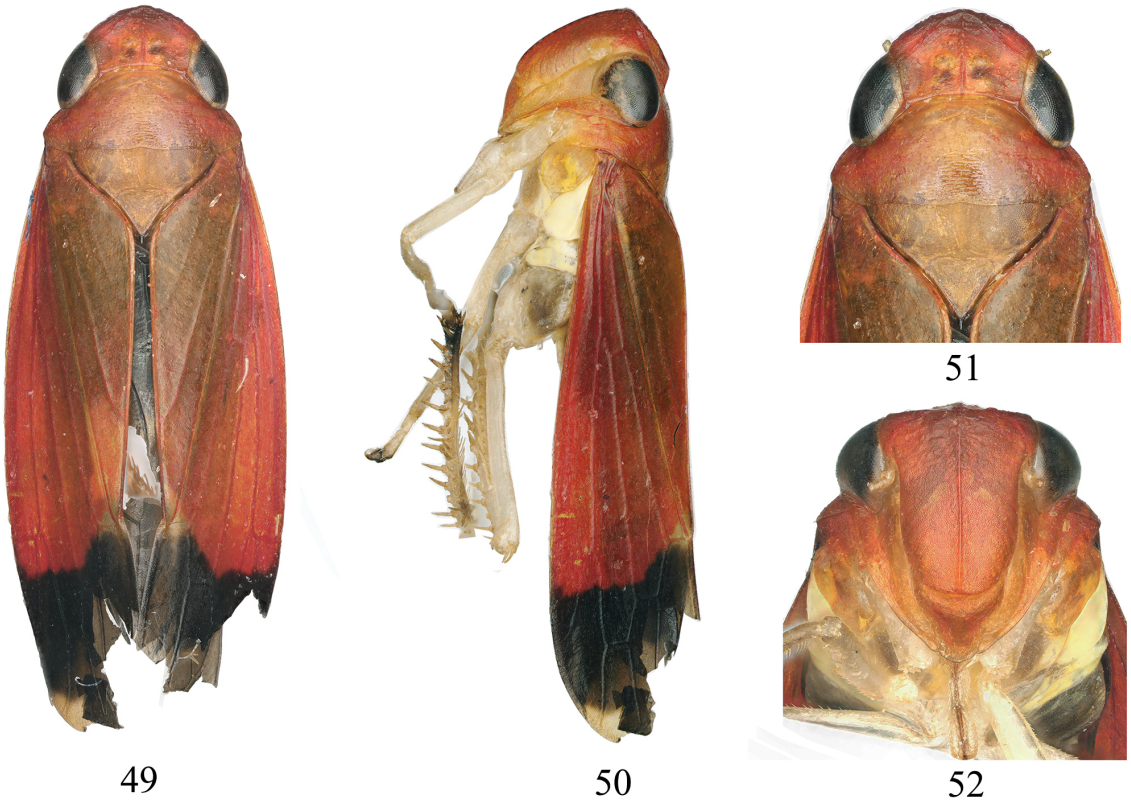


FIGURES 34–37. *Risefronta albicincta* Li & Wang, 2001, ♀: **34** dorsal view **35** lateral view **36** Head and thorax, dorsal view **37** face.

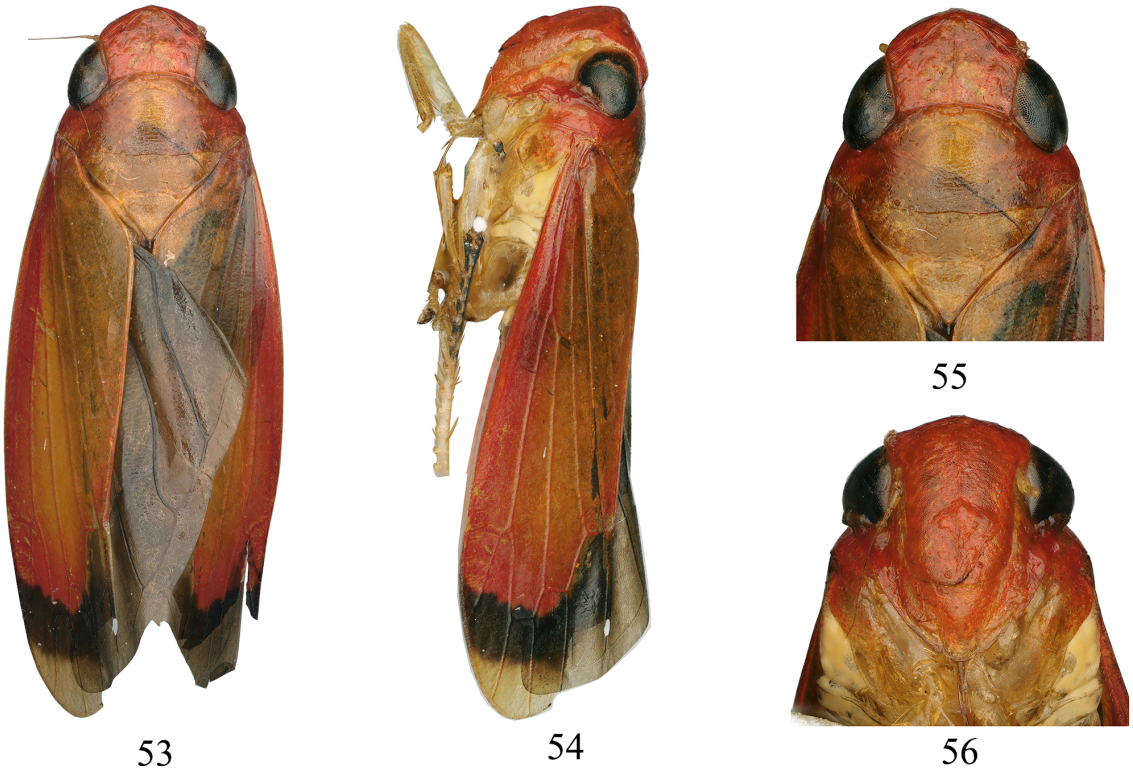
FIGURES 38–42. *Risefronta albicincta* Li & Wang, 2001, ♂: **38** Male pygofer side, lateral view **39** Subgenital plates, ventral view **40** Aedeagus, ventral view **41** Aedeagus, connective and style, lateral view **42** Connective and style, ventral view.



FIGURES 43–48. *Risefronta albicincta* Li & Wang, 2001, ♀: **43** Female genital capsule, lateral view **44** Seventh sternite, ventral view **45** First valvula, lateral view **46** Detail of sculptures of first valvula **47** Second valvula, lateral view **48** Detail of sculptures of second valaula.



FIGURES 49–52. *Paraconvexana rufa* (Li, 1994) comb. nov., ♂: **49** dorsal view **50** lateral view **51** Head and thorax, dorsal view **52** face.



FIGURES 53–56. *Paraconvexana rufa* (Li, 1994) comb. nov., ♀: **53** dorsal view **54** lateral view **55** Head and thorax, dorsal view **56** face.

Paraconvexana gen. nov.

https://zoobank.org/EA6968C6-8EF8-4109-BE9E-D72B372D64D6

Type species: *Convexana rufa* Li, 1994.

Description. Male body robust. Crown, ocellus, face, frontoclypeus, pronotum red. Eyes black. Antenna light white. Legs yellow. The length of crown less than width between eyes, about as long as pronotum. Vertex with a longtudinal ridge and two marginal ridges. Marginal ridges with lateral wrinkles. Longtudinal ridge with depressions on both sides. Pronotum middle yellow, lateral area red, with transverse indents and wrinkles, anterior edge protruding, posterior edge nearly flat. Scutellum yellowish-brown, with transverse concave wrinkles. Frontoclypeus convex, distinctly longer than width, with a longtudinal ridge and its both side with some protrusions. Forewings red, caudal margin black. Hind femur apical setal formula 2+1+1. Hind tibia flattened and nearly straight, row PD with approximately 20 macrosetae decreasing in length toward the base; row AD with approximately 13 long stout setae.

Male genitalia. Male pygofer base flat, extends obliquely to the end. Subgenital slightly curved, median area with two rows of strong setae, interior with several irregular long setae. Aedeagus with a lateral slice-like process. Connective Y-shaped, stem short. Style middle robust, extended to the outside.

Etymology. The genus name is derived from its similarity to the genus *Convexana*.

Remarks. *Paraconvexana* **gen. nov.** resembles *Convexana* Li, 1994, but differs in male body bright red (body black or yellowish-brown in *Convexana*), aedeagus base with inverted triangular process (Fig. 59). Famale seventh sternite W-shaped, with two posterior preosesses. Second valvulae with sculptures and scores.

Distribution. China (Guizhou, Guangxi, Yunnan, Sichuan)

Paraconvexana rufa (Li, 1994) comb. nov.

Convexana rufa Li, 1994: 467; Li *et al.* 2020: 147–148.

Figs 49–67

Material examined. China: 2♀, **Guizhou Prov.**, Fanjingshan, 22 July 1986, coll. Zizong Li. (GUGC); 1♂, **Guizhou Prov.**, Wangmo, 23 August 2012, coll. Shiyan Xu. (GUCC); 4♂2♀, **Guangxi Autonomous Region**, Rongshui, 20 July 2015, coll. Hongping Zhan. (GUCC); 3♂, **Sichuan Prov.**, Longcanggou, 28 July 2022, coll. Lan Zhang. (GUCC); 3♂1♀, **Guizhou Prov.**, Leigongshan, 4 August 2004, coll. Pian XU. (GUCC); 1♂2♀, **Yunnan Prov.**, Lvchun, 13 August 2014, coll. Jiankun Long. (GUCC).

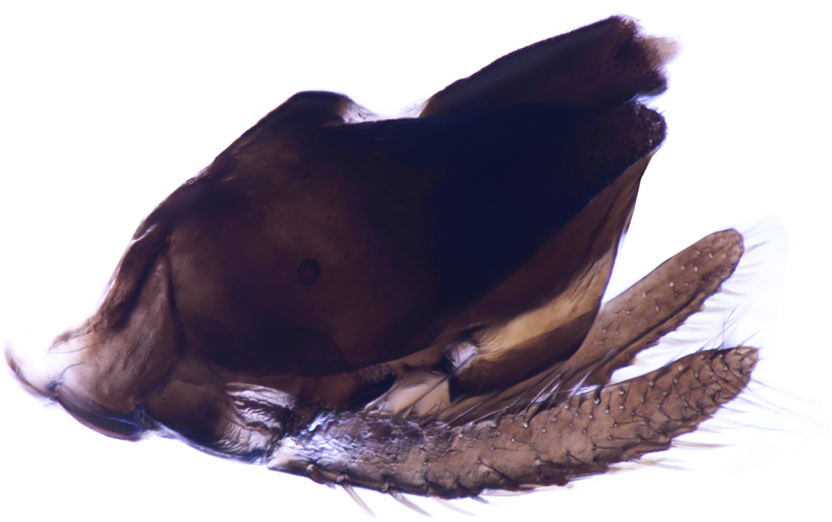
Description. Color and external features as in generic description. Famale frontoclypeus with a tumour shaped process (Figs 54, 56).

Male genitalia. Pygofer side with length about 2 times height (Fig. 57). Subgenital plate with 2 rows long macrosetae along middle margin, apex slightly narrow, outer margin nearly straight, inner margin slightly concave (Fig. 58). Aedeagus base short, apex curved, with a pointed prosess in lateral view and two slice-like processes in ventral view (Figs 59, 60). Connective Y-shaped, stem short (Fig. 61). Style middle robust, end extended to the outside (Fig. 61).

Female genitalia. Pygofer with ventroposterior margin slightly incurved (Fig. 62). Seventh sternite twice as broad as long, with two protrusions on middle of posterior margin (Fig. 63). First valvulae of ovipositor with dorsal sculpture strigate (Figs 64, 65). Second valvulae with scores, denticulate area confined to distal 1/2, denticles prominent, gradually becoming smaller distally, apex pointed (Figs 66, 67).

Measurements. Length (including tegmen): ♂ 6.6–6.8 mm, ♀ 6.8–7.0 mm.

Distribution. China (Guizhou, Guangxi, Yunnan, Sichuan).



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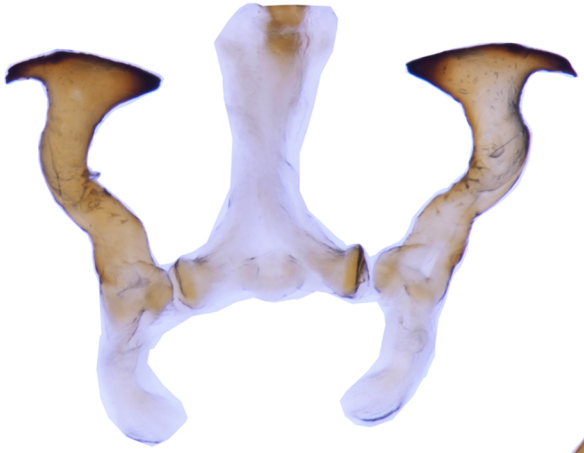

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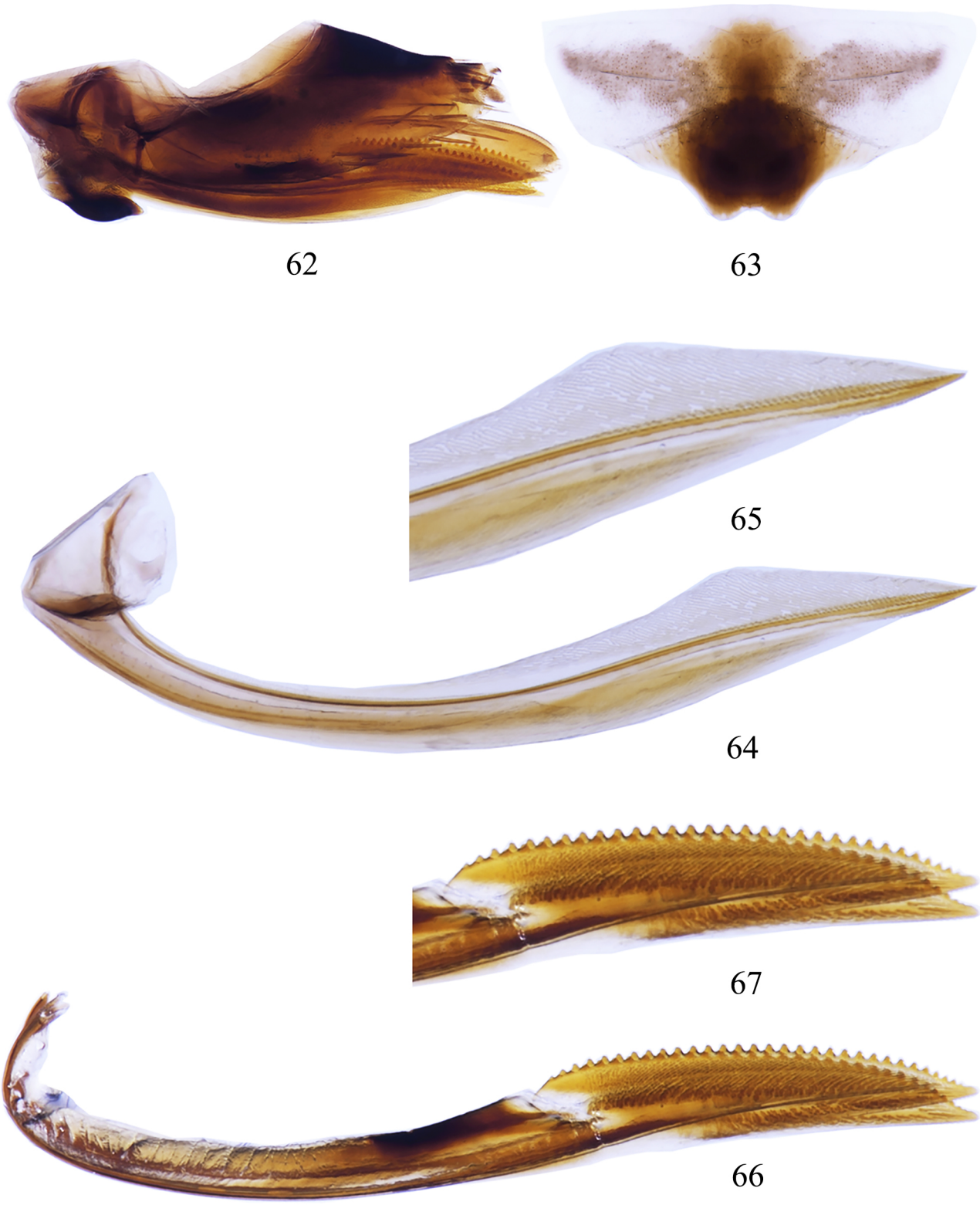
FIGURES 57–61. *Paraconvexana rufa* (Li, 1994) comb. nov., ♂: **57** Male pygofer side, lateral view **58** Subgenital plates, ventral view **59** Aedeagus, ventral view **60** Aedeagus, connective and style, lateral view **61** Connective and style, ventral view.



FIGURES 62–67. *Paraconvexana rufa* (Li, 1994) comb. nov., ♀: **62** Female genital capsule, lateral view **63** Seventh sternite, ventral view **64** First valvula, lateral view **65** Apical half of first valvula **66** Second valvula, lateral view **67** Apical half of second valaula.

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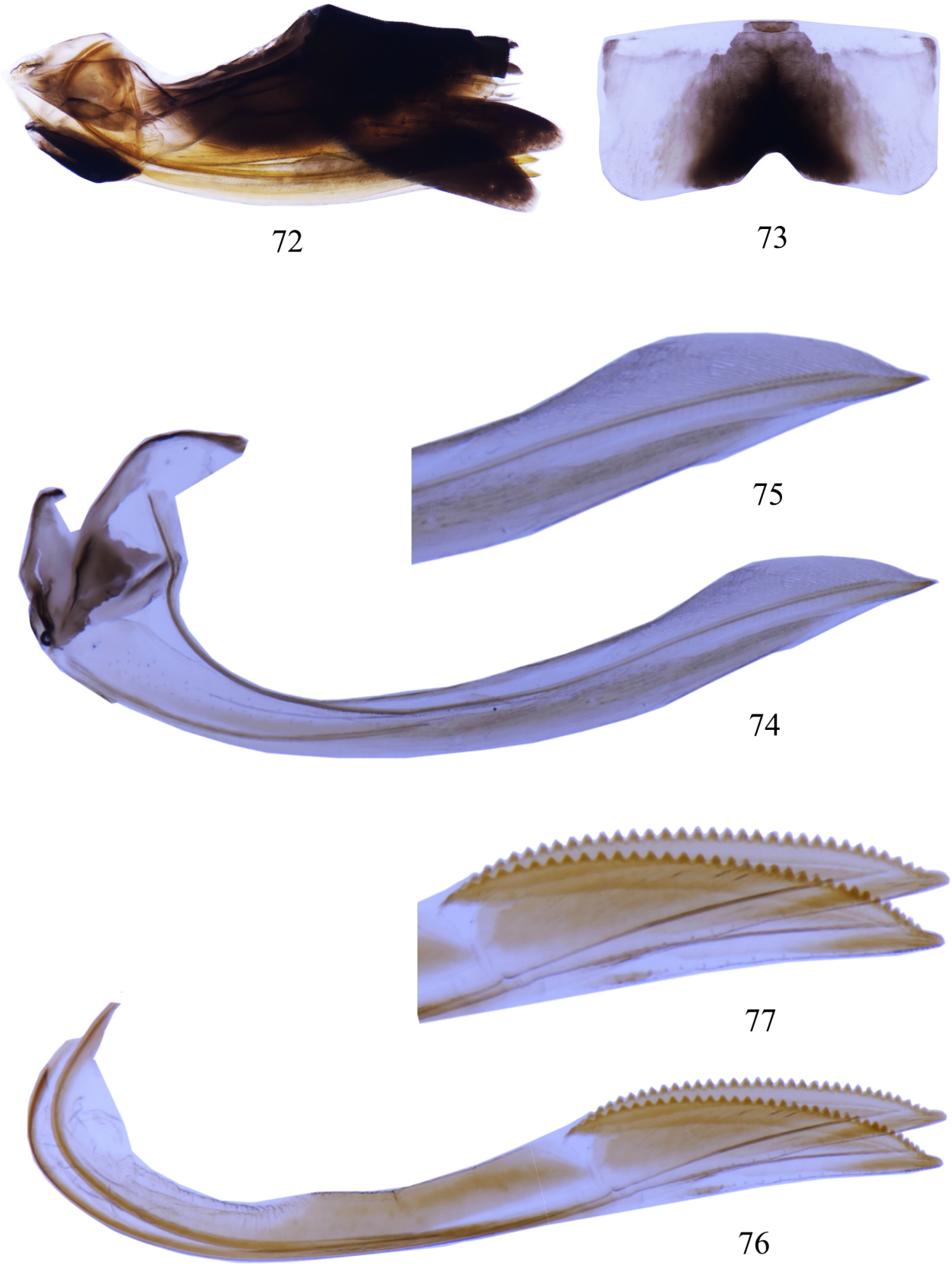
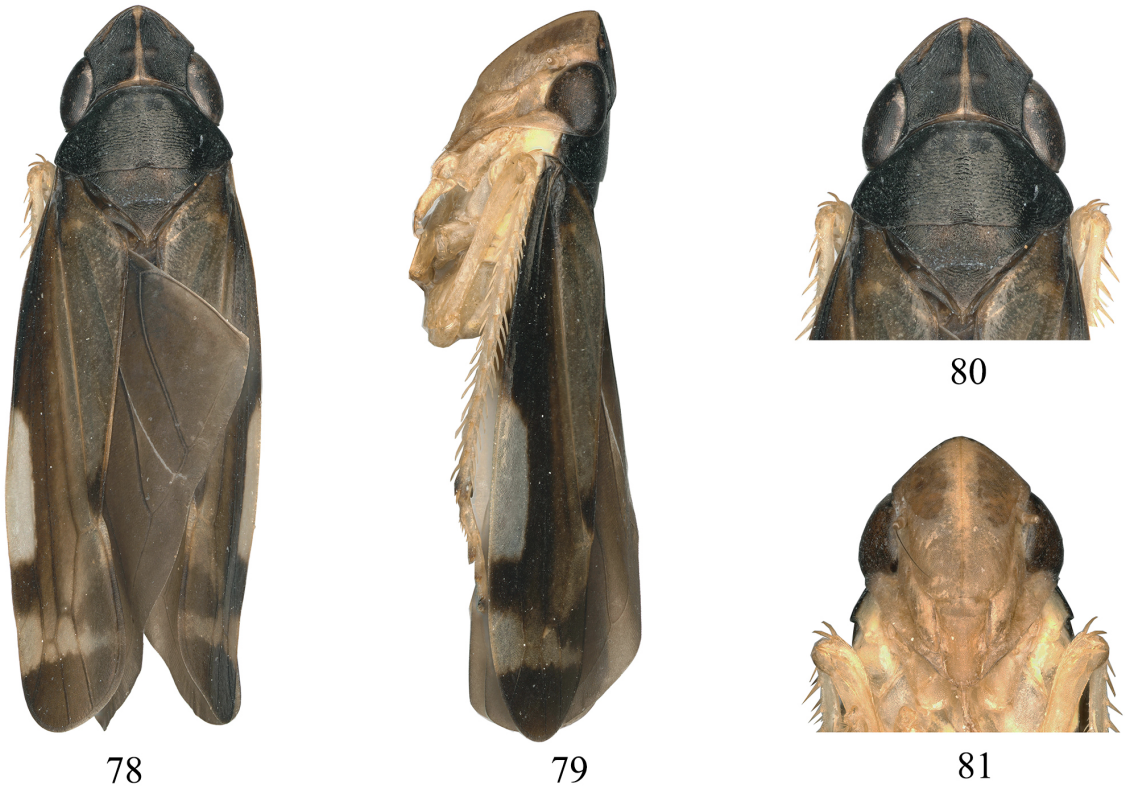
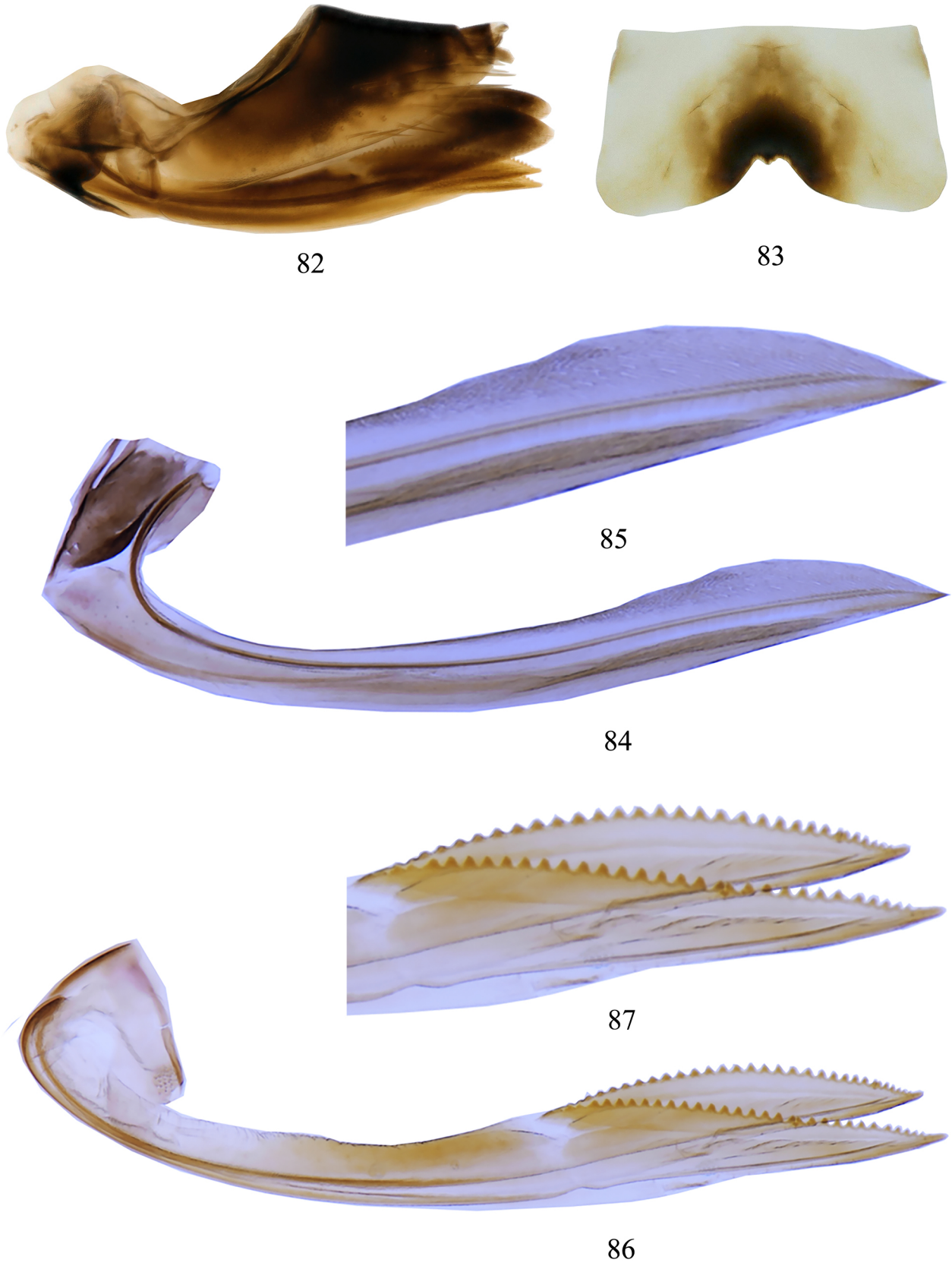
FIGURES 68–71. *Convexana albitapeta* Li, Li & Xing, 2020, ♀: **68** dorsal view **69** lateral view **70** Head and thorax, dorsal view **71** face.



FIGURES 72–77. *Convexana albitapeta* Li, Li & Xing, 2020, ♀: **72** Female genital capsule, lateral view **73** Seventh sternite, ventral view **74** First valvula, lateral view **75** Apical half of first valvula **76** Second valvula, lateral view **77** Apical half of second valaula.



FIGURES 78–81. *Convexana nigridorsuma* Li, Li & Xing, 2020, ♀: **78** dorsal view **79** lateral view **80** Head and thorax, dorsal view **81** face.



FIGURES 82–87. *Convexana nigridorsuma* Li, Li & Xing, 2020, ♀: **82** Female genital capsule, lateral view **83** Seventh sternite, ventral view **84** First valvula, lateral view **85** Apical half of first valvula **86** Second valvula, lateral view **87** Apical half of second valaula.

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Author contributions: Conceptualization: G-L Gou & J-C Xing. Project administration: J-C Xing. Resources: J-C Xing. Supervision: J-C Xing. Visualization: G-L Gou. Writing–original draft: G-L Gou. Writing–review and editing: G-L Gou & J-C Xing.

Conflict of interest: The authors have declared that no competing interests exist.

Data availability: All of the data that support the findings of this study are available in the main text.

Ethical statement: No ethical statement was reported.

Funding: This work was supported by the National Natural Science Foundation of China (32060123, 31660624), and the key project of Science-Technology Basic Condition Platform, from The Ministry of Science and Technology of the People's Republic of China (Grant No. 2005DKA21402), and the Program of Science and Technology Innovation Talents Team, Guizhou Province (No. 20144001).

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Photo Gallery

窗翅刀翅叶蝉 *Daochia fenestrata* Fang, Webb & Xing, 2020
Guiyang, Guizhou
photograph by Ri-Xin JIANG [姜日新]